



Federal Communications Commission
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SMALL ENTITY COMPLIANCE GUIDE

Human Exposure to Radiofrequency Electromagnetic Fields

**FCC 19-126
ET Docket No. 03-137
Released: December 4, 2019**

This Guide is prepared in accordance with the requirements of Section 212 of the Small Business Regulatory Enforcement Fairness Act of 1996. It is intended to help small entities—small businesses, small organizations (non-profits), and small governmental jurisdictions—comply with the revised rules adopted in the above-referenced Federal Communications Commission (FCC or Commission) rulemaking dockets. This Guide is not intended to replace or supersede these rules, but to facilitate compliance with the rules. Although we have attempted to cover all parts of the rules that might be especially important to small entities, the coverage may not be exhaustive. This Guide cannot anticipate all situations in which the rules apply. Furthermore, the Commission retains the discretion to adopt case-by-case approaches, where appropriate, that may differ from this Guide. Any decision regarding a particular small entity will be based on the statute and any relevant rules.

In any civil or administrative action against a small entity for a violation of rules, the content of the Small Entity Compliance Guide may be considered as evidence of the reasonableness or appropriateness of proposed fines, penalties or damages. Interested parties are free to file comments regarding this Guide and the appropriateness of its application to a particular situation. The FCC will then consider whether the recommendations or interpretations in the Guide are appropriate in that situation. The FCC may decide to revise this Guide without public notice to reflect changes in the FCC's approach to implementing a rule, or it may clarify or update the text of the Guide. Direct your comments and recommendations, or calls for further assistance, to the FCC's Consumer Center or the FCC's RF Safety office:

**1-888-CALL-FCC (1-888-225-5322)
TTY: 1-888-TELL-FCC (1-888-835-5322)
Videophone: 1-844-4-FCC-ASL (1-844-432-2275)
Fax: 1-866-418-0232**

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I. OBJECTIVES OF THE PROCEEDING

In the *Second Report and Order (Order)* in FCC 19-126, ET Docket No. 03-137, released December 4, 2019, the Commission amended Parts 1, 2, 15, 18, 22, 24, 25, 27, 73, 90, 95, 97, and 101 of its rules governing compliance with its radiofrequency (RF) exposure limits adopted under the National Environmental Policy Act (NEPA). The *Order* simplified the regulatory framework for determining compliance with the Commission's existing RF exposure limits by providing more efficient, practical, and consistent RF exposure exemption criteria, evaluation procedures, and mitigation measures. These changes help ensure compliance with the RF exposure limits and reduce the potential burden from misinterpreting the rules. These changes alone should not significantly affect most small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). However, compliance with the exposure limits continues to be a general requirement affecting both manufacturers and operators of RF devices and transmitters alike, and existing reference material on evaluating compliance is a significant body of information. This material, available on the Commission's website, is continually being updated as necessary to keep up with changes in technology. Given that the *Order* only makes adjustments to the rules, and compliance with the exposure limits is an on-going requirement, the purpose of this document is to supplement existing guidance, noting any changes due to the *Order* that affect the steps that small entities are already required to perform to show compliance with the Commission's RF Safety rules.

II. COMPLIANCE REQUIREMENTS

Compliance with the Commission's RF exposure limits in section 1.1310 of the Commission's rules, 47 C.F.R. § 1.1310, is an existing requirement that applies to all licensees, as well as grantees of portable, mobile, and unlicensed device equipment authorizations. Licensees and grantees are always responsible for the compliance of their sites and their equipment in protecting persons from RF exposure in excess of the limits. Still, the new rules provide greater clarity and certainty to licensees, equipment manufacturers, and the public.

While the rules state – as a NEPA processing requirement – that a formal *Environmental Assessment* must be submitted in the event that the exposure limits are to be exceeded, this wording was not intended to suggest that exposure over these limits could be allowed with the submission of an Environmental Assessment. In fact, given the potential negative impact on the quality of the human environment of such an allowance, the Commission has never accepted an Environmental Assessment for this purpose. The Commission does, as part of its licensing and equipment authorization processes, accept and publish two methods for determining and achieving compliance with the exposure limits: *Exemption*¹—consideration of whether a particular device or deployment is so clearly compliant, based on criteria in the Commission's rules, that it qualifies as exempt from the requirement to undertake a more thorough RF exposure analysis—and *evaluation*—a more specific examination of an individual site or device, which considers factors beyond those utilized for exemption and may be performed with a variety of computational and/or measurement methodologies. The Commission also provides rules related to *mitigation* in 47 C.F.R. § 1.1307—the restriction from or limitation of RF exposure in controlled areas to keep RF exposure within the Commission's established limits by, for example, using signs or barriers.

The *Order* included three major sections: (A) Exemptions from the RF exposure evaluation requirement, (B) Evaluation of RF exposure, and (C) Mitigation measures to ensure compliance with

¹ To avoid confusion in the NEPA context, we use the term “exemption” (rather than “exclusion” or “categorical exclusion”) to refer to an exemption from the obligation to perform an RF exposure evaluation. By contrast, under NEPA and the Commission's environmental rules, the term “categorical exclusion” refers to an exclusion of categories of actions from obligations to prepare an environmental assessment or other environmental evaluation.

exposure limits. A brief summary of these sections is provided below. For additional information, refer to the Internet Links and references provided in Section V below.

The *Order* also clarified responsibility at multiple transmitter sites. In general, if the Commission finds that a multiple transmitter site exceeds the applicable RF exposure limit, corrective actions are the shared responsibility of all licensees whose RF sources produce, at the area in question, levels that exceed 5% of the applicable exposure limit proportional to power. However, where it is demonstrated that a new or modified facility has put a previously-compliant site out of compliance, the licensee of that new/modified facility is solely responsible both for any compliance and for any enforcement action that may occur. This does not absolve other license holders of responsibility or place sole responsibility for mitigation on the newcomer to a site who may discover noncompliance by existing site occupants or may contribute further to pre-existing noncompliance.

A. Exemption

If a RF source is clearly compliant with the Commission's exposure limits based on criteria in 47 C.F.R. § 1.1307(b), then it qualifies as exempt from the requirement to undertake a more thorough RF exposure evaluation. The *Order* replaced the various inconsistent, service-specific criteria for exempting parties from performing an evaluation in favor of a generally applicable set of formulas for both single and multiple sources of RF emissions based on power, distance, and frequency of fixed, mobile, and portable sources.

The *Order* amended 47 C.F.R. § 1.1307(b) to adopt three broad classes of RF exemptions: (1) For extremely low-power devices that transmit at no more than 1 mW; (2) for somewhat higher-power devices with transmitting antennas that normally operate within 0.5 cm to 40 cm of the human body in the frequency range between 300 MHz and 6 GHz, a formula based primarily on the localized specific absorption rate (SAR) limits; and (3) for all other transmitters, based on a set of formulas for maximum permissible exposure (MPE) limits. The new exemption criteria apply to all Commission rules authorizing RF sources. Under the new rules, every applicant for equipment authorization and every licensee prior to deployment or commencement of operations may determine whether the device or transmitter falls under one of the classes of exemptions. If the device or transmitter falls under one of these classes of exemption, no additional action is necessary. If not, the applicant or licensee will have to perform an evaluation to determine compliance with the existing RF exposure limits.

The amended 47 C.F.R. § 1.1307(b)(3)(ii) includes rules for applying the exemptions to instances of multiple RF sources. Multiple RF sources with a fixed positional relationship are collectively exempt if the sum of their fractional contributions to the applicable thresholds is less than or equal to 1, as detailed in the summation formulas of 47 C.F.R. § 1.1307(b)(3)(ii)(B). The 1 mW exemption may be applied if the sum of the transmit powers from multiple RF sources is no more than 1 mW, or if each source transmits at no more than 1 mW and there is at least 2 cm separation distance between antennas operating at the same time. In determining the availability of an exemption, applicants are not required to account for multiple RF sources that have no fixed positional relationship between or among each other, as is typically the case between a mobile and a broadcast antenna or other fixed source or between two mobile or portable sources.

B. Evaluation

Where an exemption cannot be invoked, an evaluation shall be performed to demonstrate compliance with the Commission's RF exposure limits in 47 C.F.R. § 1.1310. Exposure limits are specified for two tiers: (1) exposure occurring in an occupational or "controlled" situation; and (2) exposure of the general population or in an "uncontrolled" situation. The occupational limits apply only

in situations in which persons are exposed as a consequence of their employment and those persons are fully aware of the potential for exposure and can exercise control over their exposure.

In most cases, evaluation does not require a determination of the precise exposure level, only the determination that it is less than the Commission's limits. In other cases, the evaluation may require more precision regarding transmitter power and antenna distance from human-accessible spaces and, potentially, may be the basis for determining necessary measures to deter humans from entering otherwise accessible locations (i.e., mitigation).

Evaluations are fundamentally based on SAR, which is a measure of power absorbed per mass of tissue (applicable at frequencies between 100 kHz and 6 GHz), and on power density (applicable at frequencies greater than 6 GHz). Exposure may be averaged over applicable time periods as specified in 47 C.F.R. § 1.1310. In many cases for mobile and fixed transmitters below 6 GHz, a practical determination of compliance with the SAR limits continues to be evaluation based on the MPE limits, which were themselves derived from the SAR limits. However, where advantageous, a valid SAR determination may be used as an evaluation to show compliance for any transmitter between 100 kHz and 6 GHz, and so would take precedence over an MPE evaluation. For portable devices designed to operate at less than 20 cm from the body and at frequencies less than 6 GHz, a SAR evaluation continues to be required unless the device is exempt from evaluation.

RF exposure may be evaluated by any valid measurement or calculation technique. The *Order* removed provisions from the rules that specified only one acceptable numerical approach and instead allowed any valid computational method supported by adequate documentation and consistent results. The *Order* also eliminated a minimum measurement distance of 5 cm for devices operating above 6 GHz, since that requirement has been rendered obsolete by technological developments and is no longer necessary. Finally, the *Order* removed reference to IEEE Standard C95.3-1991 from its rules as a possible SAR evaluation reference, instead relying on publications in the Commission's Knowledge Database (KDB) for providing guidance on technical evaluation procedures and standards.

C. Mitigation

While the purpose of evaluation is to establish whether there is a spatial region or area near transmitting antennas where the RF exposure limits are exceeded, the purpose of mitigation is to take the appropriate steps to keep persons out of that space. The Commission employs more flexible RF exposure limits in occupational/controlled settings, and mitigation measures are needed to ensure that exposure in excess of the general population/uncontrolled limits is permitted only for those with proper training and capability to limit their exposure. Such mitigation measures include labels, signs, markings, barriers, positive access controls, and occupational training. Mitigation requirements depend on the physical characteristics of the area and the level of exposure above the pertinent limits. These measures range from precluding members of the general public from entering areas where exposure exceeds the general population continuous limit, to measures allowing only trained workers to enter an area that exceeds the continuous occupational limit briefly, with protective clothing, or with an exposure monitor so that compliance with the occupational limit with 6-minute time averaging is maintained. These mitigation measures apply to fixed sites; mitigation measures for mobile and portable devices are typically based on device features such as proximity sensors or device-controlled time averaging.

The *Order* established more specific mitigation measures that include access control, signage, and training requirements for transmitter sites where RF exposure limits may be exceeded. Four categories were adopted for specifying RF safety program actions that reflect potential RF exposure scenarios. These categories range from Category One, where RF exposure limits for the general population would not be exceeded even with continuous or with source-based time-averaged exposure, to Category Four, where the exposure limit for occupational personnel would be exceeded by more than a factor of ten, or

where there is a possibility for serious contact injury, such as a severe burn, permanent tissue damage, or shock. These categories require an increasing level of mitigation measures as specified in 47 C.F.R. § 1.1307(b)(4). A graphical representation of the exposure categories and associated signage requirements is provided in Figure 1.

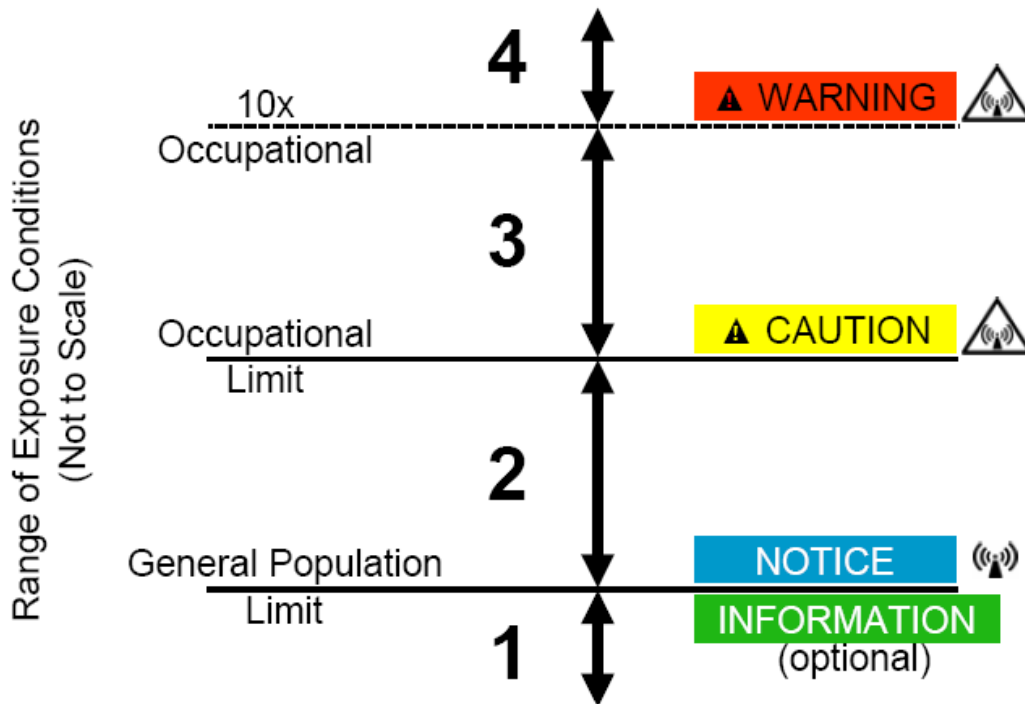


Figure 1. Graphical Representation of Exposure Categories and Associated Signage Requirements

NOTE 1: Where immediate and serious injury would occur on contact regardless of category, the following

sign components are required: **▲ DANGER** 

NOTE 2: Drawn from IEEE Std C95.7-2014 and IEEE Std C95.2-1999

The *Order* amended 47 C.F.R. § 1.1307(b) to clarify policy concerning transient exposure. A *transient individual* is an untrained person in a location where occupational limits apply, and he or she must be made aware of the potential for exposure and be supervised by trained personnel where use of time averaging is required to ensure compliance with the general population exposure limits. Thus, the occupational exposure limits apply only if a person has been trained and has sufficient information to be fully aware of nearby RF sources and the necessity and means of avoiding overexposure.

III. RECORDKEEPING AND REPORTING REQUIREMENTS

The Commission maintains two regulatory approval tracks that apply to RF transmitters and are relevant to RF exposure compliance: (1) licensing and (2) equipment authorization. A license is an authorization to operate one or more transmitters in a specific frequency range and geographic area (or at a specific site) according to the Commission's rules for a particular service. A license does not generally specify all of the equipment to be used by a licensee. In contrast, the equipment authorization program

requires certification of specific transmitting devices and associated equipment for use in particular services. Some services are licensed by rule, where the licensees do not require individualized licenses. In such services, the transmitters used by these licensees are only subject to equipment certification. The Commission also allows some devices to be operated on an unlicensed basis, and those devices are also subject only to equipment certification. (In contrast to services licensed by rule, however, the operators of devices used in unlicensed services are not classified as licensees.)

The Commission's Bureaus and Offices administer licensing through various computer systems and databases. Those systems, which provide information about RF transmitters, can be searched at: <https://www.fcc.gov/licensing-databases/search-fcc-databases>. The equipment authorization system, administered by the FCC Office of Engineering and Technology's Laboratory, offers information about RF equipment and devices, and can be accessed at: <https://www.fcc.gov/oet/ea/fccid>. Within the equipment authorization system, the Knowledge Database (KDB) offers guidance on many topics, including RF exposure compliance. Major documents in the KDB can be found at: <https://apps.fcc.gov/oetcf/kdb/reports/GuidedPublicationList.cfm>.

Generally, application forms for licenses and grants of equipment authorization for RF transmitters contain a set of certifications where the applicant attests to a set of facts. The application forms typically require an applicant to certify compliance with the exposure limits. In many cases, this certification is the only routine requirement to demonstrate compliance with the exposure limits. However, the Commission may at any time request technical information to support a determination of exposure levels for any transmitter, device, or site. These requests are not uncommon during the Commission's standard application and renewal processes in situations where the transmitter is capable of operating close to the exposure limits. For broadcast sites, application forms include worksheets that the applicant may use to determine compliance and support a certification of compliance without a requirement to submit the worksheet itself. In cases where the worksheet cannot be used to show compliance, an exhibit showing compliance with the exposure limits is typically required to be filed with the application. Such exhibits do not have a standard format but previously filed exhibits can be readily accessed at the Commission's licensing databases (URL listed above). Similarly, applications for equipment authorization for various portable and mobile transmitters require submission of RF exemption or evaluation analysis that shows compliance with the exposure limits.

The terms "portable," "mobile," and "fixed" in regard to transmitters have particular meanings with respect to implementation of the RF exposure limits (see 47 C.F.R. §§ 2.1091 and 2.1093). Devices that by design are intended to be used with the radiating structure(s) within 20 centimeters (approximately 8 inches) of the body are classified as portable, and when not exempt from evaluation are required to be tested for compliance with applicable SAR or MPE limits under specified conditions (see 47 C.F.R. §§ 1.1310 and 2.1093). Testing considerations and test reduction procedures can be found in KDB 447498 and other published RF exposure KDB procedures, available at the link above for the KDB system. All other devices and transmitters that are normally operated with the antenna or radiating structure more than 20 centimeters from the body are classified as either mobile or fixed (depending on whether they are rendered physically immobile when installed) and for these transmitters compliance is generally measured against the MPE field strength or power density limits in 47 C.F.R. § 1.1310.

Members of the general public and small entities that operate or provide space for transmitters but are not required to submit applications to the Commission have a role to play in ensuring compliance with the exposure limits. These entities should be informed about practices that may result in exposure over the limits. For example, a Wi-Fi access point or utility "Smart Meter" may be authorized for use only at distances greater than 20 centimeters (approximately 8 inches) from all persons and this requirement needs to be effectively communicated to both the installer and consumer. Similarly, owners of buildings and towers that host transmitting antennas are encouraged to cooperate with the efforts of licensees to limit access to areas exceeding the Commission's RF exposure limits.

IV. IMPLEMENTATION DATE

All rule changes in the *Order* are effective as of May 3, 2021.² A two-year period for licensees and operators of existing facilities and operations to verify and ensure compliance with the new rules also began on that date. As of May 3, 2021, all new facilities and operations (e.g., broadcast facilities, wireless base stations), including facilities deployed and operating under existing license authorization or rule part (such as a geographic area license or unlicensed or licensed by rule) whose construction and operation is completed on or after that date, must comply with the new rules. In addition, any facility or operation that is modified in a way that could affect RF exposure also must comply with the new rules no later than the time at which it is modified. All other licensees and operators of existing facilities and operations will have until May 3, 2023 to ensure that they are in compliance with the new rules. Parties with equipment authorizations may continue to rely upon their compliance with the rules as they existed prior to the implementation of the *Order* as long as certified equipment is not modified in a way that could affect RF exposure; a two-year review period is not needed for such equipment. Certification applications for new and modified equipment must comply with the equipment authorization procedures and associated guidance in effect at the time the application is made to the Commission. Further clarification of the rule implementation date and two-year review period can be found in *Public Notice* DA 21-363.³

V. INTERNET LINKS

A copy of the *Order* is available at:

<https://www.fcc.gov/document/fcc-maintains-current-rf-exposure-safety-standards>.

A copy of the Federal Register Summary of the *Order* is available at:

<https://www.govinfo.gov/content/pkg/FR-2020-04-01/pdf/2020-02745.pdf>.

A copy of the Federal Register correction with delay of effective date is available at:

<https://www.govinfo.gov/content/pkg/FR-2020-06-02/pdf/2020-11969.pdf>.

Further clarification of the rule implementation date and two-year review period can be found in *Public Notice* DA 21-363, available at:

<https://docs.fcc.gov/public/attachments/DA-21-363A1.pdf>.

General methods for the determination of compliance with the exposure limits for environmental RF sources are available in Office of Engineering and Technology (OET) Bulletin 65:

<https://transition.fcc.gov/bureaus/oet/info/documents/bulletins/oet65/oet65.pdf>.

Several other related documents and general information are available at:

<http://www.fcc.gov/rfsafety>.

For guidance on compliance for mobile and portable devices see the links in Section III above for appropriate KDB. For further information and/or assistance email: RFSafety@FCC.gov.

² Consistent with 85 FR 18131, select rule changes published in the *Order*, including changes to 47 CFR § 1.1310 and conforming edits to 47 CFR §§ 1.4000 and 2.1033, and Parts 15, 18, 22, 24, 25, 27, 73, 90, 95, 97, 101, went into effect on June 1, 2020.

³ *Office of Engineering and Technology Announces May 3, 2021 as the Effective Date for RF Exposure Rule Changes and Beginning of the Two-Year Review Period for Existing Parties*, Public Notice DA 21-363, Released April 2, 2021.